Studymate Foundation Paper

Date : 23/12/2018 Duration : 90 Min. Max. Marks : 90	Science & Mathematics (Set-2)	CLASS X

General Instructions:
1. All questions are compulsory.
2. Each question is allotted ONE mark for each correct response.
3. No deduction from the total score will be made if no response is indicated for the question in the answer sheet.
4. There is only **ONE** correct response for each question. Filling up **MORE THAN ONE** response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly.
5. Use of calculators is not allowed.

Section A – Science

1. A current of 1 A is drawn by a filament of an electric bulb. Number of electrons passing through a cross-section of the filament in 16 second would be roughly

   (a) 10^{20} (b) 10^{16} (c) 10^{18} (d) 10^{23}

2. Which of the following represents voltage?

   (a) $\dfrac{\text{work done}}{\text{current} \times \text{time}}$ (b) work done × charge

   (c) $\dfrac{\text{work done} \times \text{time}}{\text{current}}$ (d) work done × charge × time

3. A student carries out an experiment and plots the V-I graph of three samples of nichrome wire with resistances R_1, R_2 and R_3 respectively. Which of the following is true?
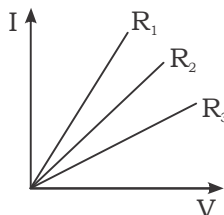
   (a) $R_1 = R_2 = R_3$ (b) $R_1 > R_2 > R_3$ (c) $R_2 > R_3 > R_1$ (d) $R_3 > R_2 > R_1$

4. A cylindrincal conductor of length l and uniform area of cross-section A has resistnace R. Another conductor of length $2l$ and resistnace R of the same material has area of cross-section

   (a) A/2 (b) 3A/2 (c) 2A (d) 3A

5. The resistivity does not change if

   (a) the material is changed.
   (b) the temperature is changed.
   (c) the shape of the resistor is changed.
   (d) both material and temperature are changed.

6. A 100Ω nichrome wire is doubled on itself. The new resistance of this wire is

   (a) 25Ω (b) 50Ω (c) 100Ω (d) 400Ω

7. Magnetic induction does not involve

(a) placing a magnetic material near a magnet.

(b) touching a magnetic material with a magnet.

(c) induction of opposite pole on the nearer side of magnetic material facing the magnet.

(d) induction of similar pole on the farther side of magnetic material away from the magnet.

8. Electrons are going around a circle in an anticlockwise direction as shown. At the center of the circle, they produce a magnetic field that is
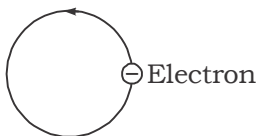
⊖Electron

(a) into the page (b) out of the page (c) to the left (d) to the right

9. Commercial electric motors do not use

(a) an electromagnet to rotate the armature.

(b) effectively large number of turns of conducting wire in the current-carrying coil.

(c) a permanent magnetic to rotate the armature.

(d) a soft iron core on which the coil is wound.

10. Choose the incorrect statement

(a) Fleming's right-hand rule is a simple rule to know the direction of induced current.

(b) The right-hand thumb rule is used to find the direction of magnetic fields due to current-carrying conductors.

(c) The difference between the direct and alternating currents is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically.

(d) In India, the AC changes direction after every 1/50 second.

11. The most important safety method used for protecting home appliances from short-circuiting or overloading is

(a) earthing (b) use of fuse

(c) use of stabilizers (d) use of electric meter

12. In a hydroelectric power plant, more electrical power can be generated if water falls from a greater height because

(a) its temperature increases.

(b) larger amount of potential energy is converted into kinetic energy.

(c) the electricity content of water increases with height.

(d) more water molecules dissociate into ions.

13. The major problem in harnessing nuclear energy is how to

(a) split nuclei?

(b) sustain the reaction?

(c) dispose off spent fuel safely?

(d) convert nuclear energy into electrial energy?

14. Choose the correct statement

(a) Sun is an expensive source of energy.

(b) There is infinite storage of fossil fuel inside the earth.

(c) Hydro and wind energy plants are renewable sources of energy.

(d) Waste from a nuclear power plant can be easily disposed off.

15. The power of a lens is – 3.5 D. The lens is

    (a) Convex   (b) Plano-convex   (c) Concave   (d) Plano-concave

16. Sodium carbonate solution is added to dilute ethanoic acid. It is observed that:

    (a) A gas evolves   (b) A solid settles at the bottom

    (c) The mixture becomes warm   (d) The colour of the mixture

17. 2ml of acetic acid is added to 5ml of water and was shaken up for 1minute, it was noticed that:

    (a) The acid formed a separate layer on the top of water

    (b) A clear and homogeneous solution is formed

    (c) Water formed a separate layer on the top of the acid

    (d) A pink and clear solution is formed

18. Which of the following is the correct order of size:

    (a) $I^+ > I^- > I$ (b) $I^- > I > I^+$ (c) $I > I^+ > I^-$ (d) $I > I^- > I^+$

19. Chemical changes are _____ .

    (a) temporary, reversible and a new substance is produced.

    (b) always accompanied by exchange of light

    (c) permanent, irrevarsible and a new substance is produced.

    (d) never accompanied by exchange of light and heat energy.

20. In one molecule of ammonium sulphide there are _____ .

    (a) 2 atoms of N, 8 atoms of H, and 1 atoms of S

    (b) 1 atom of N, 4 atoms of H, and 1 atom of S

    (c) 1 atom of N, 4 atoms of H, and 2 atoms of S

    (d) 2 atoms of N, 8 atoms of H, and 2 atoms of S

21. Whcih of the following is not a mineral acid?

    (a) Hydrochloric acid   (b) Citric acid   (c) Sulphuric acid   (d) Nitric acid

22. What happens when a solution of an acid ismixed with a solution of a base in a test tube?

    (i) The temperature of the solution increases generally.

    (ii) The temperature of the solution decreases.

    (iii) The temperature of the solution remains the same.

    (iv) Salt formation takes places.

    (a) (i) only   (b) (i) and (iii)   (c) (ii) and (iii)   (d) (i) and (iv)

23. Which of the following method is not used in preparing a base?

    (a) Burning of metal in air.   (b) Adding water to a metal oxide.

    (c) Reaction between an acid and base.   (d) Heating metal carbonates.

24. The correctly balanced equation for $FeS + O_2 \rightarrow Fe_2O_3 + SO_2$ is _____ .

    (a) $2FeS + O_2 \rightarrow Fe_2O_3 + 4SO_2$ (b) $2FeS + 3O_2 \rightarrow Fe_2O_3 + 4SO_2$

    (c) $4FeS + 4O_2 \rightarrow 2Fe_2O_3 + 2SO_2$ (d) $4FeS + 7O_2 \rightarrow 2Fe_2O_3 + 4SO_2$

25. Which of the following is not a decomposition reaction?

    (a) $CaCO_3 \rightarrow CaO + CO_2$ (b) $2KClO_3 \rightarrow 2KCl + 3O_2$

    (c) Digestion of food in the body   (d) $H_2 + Cl_2 \rightarrow 2HCl$

26. What happens when dilute hydrochloric acid is added to iron fillings?

    (a) Hydrogen gas and iron chloride are produced.

    (b) Chlorine gas and iron hydroxide are produced.

    (c) No eraction takes palce.

    (d) Iron salt and water are produced.

27. The most abundant metal in the earth crust is?

    (a) Al   (b) Fe   (c) O   (d) Cu

28. Because of high electropositivity, the atom of metals can easily form

    (a) Positive ions   (b) Negatively ions   (c) Neutral ions   (d) Covalent bonds

29. What happens when calcium is treated with water?

    (i)   It does not react with water

    (ii) It reacts violently with water

    (iii) It reacts less violently with water

    (iv) Bubbles of hydrogen gas formed stick to the surgace of calcium

    (a) (i) and (iv)   (b) (ii) and (iii)   (c) (i) and (ii)   (d) (iii) and (iv)

30. The composition of aqua-regia is

    (a) Dil.HCl : Conc. HNO_3 (b) Conc. HCl : dil. HNO_3

    (c) Conc. HCl : Conc. HNO_3 (d) Dil. HCl : Dil. HNO_3

31. When carbon monoxide combines with haemoglobin it forms

    (A) Oxyhaemoglobin   (B) Carbonic Acid

    (C) Carboxyhaemoglobin   (D) Carbaminohaemoglobin

32. Heart failure is

    (A) Heart stops functioning

    (B) Sufficient amount of blood is not pumped by the heart

    (C) Oxygen is less in the environment

    (D) Both A and B

33. Stress hormone in plants is

    (A) Auxin   (B) Cytokinin   (C) Abscisic acid   (D) Ethylene

34. Who among the following won the Stockholm Water Prize.

    (A) Dr Rajender Prasad   (B) Raja Ramanna

    (C) Har Govind Khorana   (D) Dr. Rajendra Singh

35. The offspring resulting from a cross between two pure homozygous recessives would be _____.

    (A) 50% homozygous recessive and 50% homozygous dominant

    (B) 75% homozygous recessive and 25% heterozygous dominant

    (C) 75% homozygous recessive and 25% homozygous dominant

    (D) 100% homozygous recessive

36. The testis descend out of the abdominal cavity during the stages of development because

    (A) Space is not enough for the development of the testis

    (B) Spermatogenesis require higher temperature than the body temperature

    (C) Testis are overprotected.

    (D) Spermatogenesis require lower temperature than the body temperature

37. The concept of 'Biosphere Reserve' was evolved by

    (A) Government of India   (B) Botanical Survey of India

    (C) UNESCO   (D) UNDP

38. Human being belongs to the species of _____.

    (A) Homo erectus   (B) Homo habillis

    (C) Homo sapiens sapiens   (D) Hominidae

39. An endothermic reaction using sunlight in the plants produces two compounds X and Y.The two compounds produced are

(A) X-CO_2,Y-H_2O (B) X-$C_6H_{12}O_6$, Y-O_2

(C) X-Carbon Dioxide, Y-O_2 (D) X-$C_6H_{12}O_6$, Y-H_2O

40. When Carbon Dioxide is passed through Lime water it turns milky because of

(A) the formation of soluble Calcium Carbonate

(B) the displacement of Calcium

(C) the formation of Calcium Oxide

(D) the formation of insoluble Calcium Carbonate

41. Heredity or inheritance of specific traits became clearer due to

(A) Lamarck's theory   (B) Mendel worked on garden peas

(C) Darwinism   (D) Neo-Darwinism

42. Prenatal sex determination is banned by the law in India because of the-

(A) High cost charged by the doctor   (B) Increase in case of male foeticide

(C) Possible danger of mother's health   (D) Increase in case of female foeticide

43. _____is the part of the alimentary canal where maximum absorption of digested food takes place

(A) Duodenum   (B) Colon   (C) Jejenum   (D) Ileum

44. Trophic level in an ecosystem represents

(A) oxygen level   (B) water level   (C) energy level   (D) salt level

45. In Drosophila the diploid number is 8. How many chromosomes are present in the Drosophila sperm?

(A) 8   (B) 4

(C) cannot determine from this information   (D) 16

Section – B (Mathematics)

46. The length of tangents drawn from an external point to a circle are

(a) equal   (b) one third   (c) one fourth   (d) half

47. A point P is 26 cm away from the centre of a circle and the length of the tanget drawn from P to the circle is 24 cm. Find the radius of the circle.
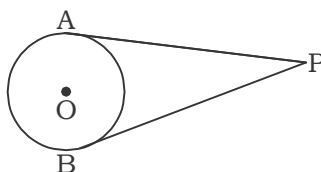
(a) 10 cm   (b) 11 cm   (c) 16 cm   (d) 15 cm

48. To construct a triangle similar to a given ∆ABC with its sides $\frac{2}{5}$ of the corresponding sides of ∆ABC, first draw a ray BX such that angle CBX is an acute angle X lies on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on ray BX is

(a) 3   (b) 8   (c) 5   (d) 2

49. To draw a pair of tangents to a circle which are inclined to each otehr at an angle of 30°, it is required to draw tangents at end points of those two radii of the circle. The angle between them, should be

(a) 150°   (b) 90°   (c) 60°   (d) 120°

50. The areas of the two circles are in the ratio 4 : 9. The ratio of their circumference is

    (a) 2 : 3   (b) 4 : 9   (c) 9 : 4   (d) None of these

51. The value of p so that the quadratic equation $x^2 + 5px + 16 = 0$ has no real roots, is

    (a) $-\dfrac{8}{5} < p < \dfrac{8}{5}$ (b) $p < 5$ (c) $p < 8$ (d) $-\dfrac{8}{5} \le p \le 0$

52. If a, $a - 2$ and $3a$ are in A.P., then the value of a is

    (a) –2   (b) –3   (c) 3   (d) 2

53. The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$. The angle of elevation of the sum is

    (a) 30°   (b) 60°   (c) 45°   (d) None of these

54. What is the angle of elevation of the sun when the length of the shadow of a vertical pole is equal to its height?

    (a) 45°   (b) 60°   (c) 30°   (d) None of these

55. A tower is 50m high. Its shadow is 'x' metres shorter when the sun's altitude is 45° than when it is 30°. Find the value of 'x'

    (a) $50(\sqrt{3} - 1)\,\text{m}$ (b) $\dfrac{200}{\sqrt{3}}\,\text{m}$ (c) $100\sqrt{3}\,\text{m}$ (d) None of these

56. If the zeros of the quadratic polynomial $ax^2 + bx + c$, where $a \ne 0$ and $c \ne 0$, are equal, then

    (a) c and a have the same sign   (b) c and a have opposite signs

    (c) c and b have the same sign   (d) c and a have opposite signs

57. The zeroes of the quadratic polynomial $x^2 + kx + k$, where $k > 0$

    (a) are both positive   (b) are both negative

    (c) are always equal   (d) are always unequal

58. On dividing a polynomoal $p(x)$ by a non-zero polynomial $q(x)$, let $q(x)$ be the quotient and $r(x)$ be the reminder, then $p(x) = q(x).\,q(x) + r(x)$, where

    (a) $r(x) = 0$ always   (b) deg $r(x) <$ deg $g(x)$ always

    (c) either $r(x) = 0$ or deg $r(x) <$ deg $g(x)$ (d) $r(x) = g(x)$

59. For what value of k do the equations $kx - 2y = 3$ and $3x + y = 5$ represent two lines intersecting at a unique point?

    (a) $k = 3$ (b) $k = -3$

    (c) $k = 6$ (d) all real values except –6

60. One equation of a pair of dependent equations is $-5x + 2y = 4$. The second equation can be

    (a) $10x + 4y + 8 = 0$ (b) $-10x - 4y + 8 = 0$ (c) $-10x + 4y = 8$ (d) $10x - 4y = 8$

61. A steel wire when bent in the form of a square, encloses an area of 121 sq. cm. The same wire is bent in the form of a circle. Area of the circle is

    (a) 111 cm²   (b) 84 cm²   (c) 259 cm²   (d) 154 cm²

62. If the HCF of 65 and 117 is of the form (65m – 117), then $m =$

    (a) 1   (b) 2   (c) 3   (d) 4

63. For some positive integer n, every positive odd integer is of the form

    (a) $n - 1$ (b) $n + 1$ (c) $2n$ (d) $2n + 1$

64. A positive integer n when divided by 9, gives 7 as remainder. What will be the remainder when $(3n - 1)$ is divided by 9?

    (a) 1   (b) 2   (c) 3   (d) 4

65. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2, then the value of k is

    (a) $\dfrac{5}{6}$ (b) $\dfrac{-5}{6}$ (c) $\dfrac{6}{5}$ (d) $\dfrac{-6}{5}$

66. The line segments joining the midpoints of the sides of a triangle form four triangles, each of which is

(a) congruent to the original triangle   (b) similar to the original triangle

(c) an isosceles triangle   (d) an equilateral triangle

67. If $(\tan^2 45° - \cos^2 30°) = x \sin 45° \cos 45°$, then $x =$

(a) 2   (b) –2   (c) $\dfrac{1}{2}$ (d) $\dfrac{-1}{2}$

68. If $\tan x = 3\cot x$, then $x =$

(a) 45°   (b) 60°   (c) 30°   (d) 15°

69. If $\sin \alpha = \dfrac{1}{2}$ and $\cos \beta = \dfrac{1}{2}$, then $(\alpha + \beta) =$

(a) 0°   (b) 30°   (c) 60°   (d) 90°

70. If $\cos A + \cos^2 A = 1$, then $(\sin^2 A + \sin^4 A) =$

(a) $\dfrac{1}{2}$ (b) 2   (c) 1   (d) 4

71. The pair of equations $y = 0$ and $y = -5$ has

(a) one solution   (b) two solutions

(c) infinitely many solutions   (d) no solution

72. In a $\triangle ABC$, $\angle C = 3\angle B = 2(\angle A + \angle B)$, then $\angle B = ?$

(a) 20°   (b) 40°   (c) 60°   (d) 80°

73. In $\triangle ABC$ and $\triangle DEF$, it is given that $\dfrac{AB}{DE} = \dfrac{BC}{FD}$, then

(a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$

74. If $\triangle ABC \sim \triangle EDF$ and $\triangle ABC$ is not similar to $\triangle dEF$, then which of the following is not ture?

(a) BC.EF = AC.FD   (b) AB.EF = AC.DE   (c) BC.DE = AB.EF   (d) BC.DE = AB.FD

75. If in $\triangle ABC$ and $\triangle PQR$, we have: $\dfrac{AB}{QR} = \dfrac{BC}{PR} = \dfrac{CA}{PQ}$, then

(a) $\triangle PQR \sim \triangle CAB$ (b) $\triangle PQR \sim \triangle ABC$ (c) $\triangle CBA \sim \triangle PQR$ (d) $\triangle BCA \sim \triangle PQR$

76. While computing the mean of the grouped data, we assume that the frequencies are

(a) evenly distributed over the classes   (b) centred at the class marks of the classes

(c) centred at the lower limits of the classes   (d) centred at the upper limits of the classes

77. The relation between mean, mode and median is

(a) mode = (3 × mean) – (2 × median)   (b) mode = (3 × median) – (2 × mean)

(c) median = (3 × mean) – (2 × mode)   (d) mean = (3 × median) – (2 × mode)

78. Three coins are tossed simultaneously. What is the probability of getting exactly two heads?

(a) $\dfrac{1}{2}$ (b) $\dfrac{1}{4}$ (c) $\dfrac{3}{8}$ (d) $\dfrac{3}{4}$

79. If the points A(1, 2) O(0, 0) and C(a, b) are collinear, then

(a) $a = b$ (b) $a = 2b$ (c) $2a = b$ (d) $a + b = 0$

80. Two friends were born in the year 2000. What is the probability that they have the same birthday?

(a) $\dfrac{1}{365}$ (b) $\dfrac{1}{366}$ (c) $\dfrac{2}{365}$ (d) $\dfrac{1}{183}$

81. $(\sec A + \tan A)(1 - \sin A) =$

(a) sin A   (b) cos A   (c) sec A   (d) cosec A

82. $(\cos^4\theta - \sin^4\theta) =$

    (a) $1 - 2\sin^2\theta$ (b) $1 - 2\cos^2\theta$ (c) $2 - \sin^2\theta$ (d) $2 - \cos^2\theta$

83. $\sin\theta \cos(90° - \theta) + \cos\theta \sin(90° - \theta) = ?$

    (a) 0   (b) 1   (c) 2   (d) $\dfrac{3}{2}$

84. The cumulative frequency table is useful in determining the

    (a) mean   (b) median   (c) mode   (d) all of these

85. If x_i's are the midpoints of the class intervals of a grouped data, f_i's are the corresponding frequencies and $\overline{x}$ is the mean, then $\sum f_1(x_1 - \overline{x}) =$

    (a) 1   (b) 0   (c) –1   (d) 2

86. What point on x-axis is equidistant from the points A(7, 6) and B(–3, 4)?

    (a) (0, 4)   (b) (–4, 0)   (c) (3, 0)   (d) (0, 3)

87. The ratio of the total surface area to the lateral surface area of a cylinder with base radius 80 cm and height 20 cm is

    (a) 2 : 1   (b) 3 : 1   (c) 4 : 1   (d) 5 : 1

88. In a right circular cone, the cross section made by a plane parallel to the base is a

    (a) sphere   (b) hemisphere   (c) circle   (d) a semicircle

89. On increasing each of the radius of the base and the height of a cone by 20% its volume will be increased by

    (a) 20%   (b) 40%   (c) 60%   (d) 72.8%

90. If P(–1, 1) is the midpoint of the line segment joining A(–3, b) and B(1, b + 4), then $b =$

    (a) 1   (b) –1   (c) 2   (d) 0

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